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PATENT  
Attorney Docket No.: MFL-003  
(5407/9)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICANTS: Yu *et al.* CONFIRMATION NO.: 4824  
SERIAL NO.: 10/771,739 GROUP NO.: 2123  
FILING DATE: February 4, 2004 EXAMINER: Not yet assigned  
TITLE: APPARATUS AND METHODS FOR PERFORMING PROCESS  
SIMULATION USING A HYBRID MODEL

**CERTIFICATE OF FIRST CLASS MAILING UNDER 37 C.F.R. 1.8**

I hereby certify that this correspondence, and any documents referred to as enclosed herein, are being deposited with the United States Postal Service as first class mail, postage prepaid, in an envelope addressed to Mail Stop Missing Parts, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on this 16<sup>th</sup> day of August, 2004.

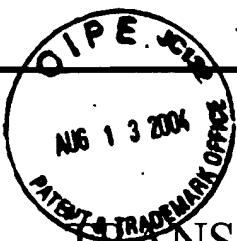
  
Lisa Marie Solis

Mail Stop Amendment  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Sir:

Submitted herewith are:

1. Transmittal Form (1 pg.);
2. Information Disclosure Statement (2 pgs.);
3. Form PTO-1449 (9 pgs.);
4. Copy of cited references B1-B12 and C1-C97; and
5. Return Receipt Postcard.



# TRANSMITTAL FORM

	Application Serial Number <b>10/771,739</b> Filing Date <b>February 4, 2004</b> First Named Inventor <b>Yu</b> Group Art Unit <b>2123</b> Examiner Name <b>Not yet assigned</b> Attorney Docket No. <b>MFL-003</b> Patent No. <b>Not applicable</b> Issue Date <b>Not applicable</b>
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**ENCLOSURES (check all that apply)**

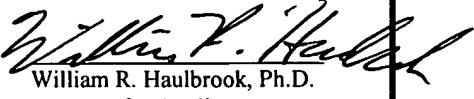
<input type="checkbox"/> Fee Transmittal Form <ul style="list-style-type: none"> <li><input type="checkbox"/> Check Attached</li> <li><input type="checkbox"/> Copy of Fee Transmittal Form</li> </ul> <input type="checkbox"/> Amendment/Response <ul style="list-style-type: none"> <li><input type="checkbox"/> Preliminary</li> <li><input type="checkbox"/> After Final</li> <li><input type="checkbox"/> Affidavits/declaration(s)</li> <li><input type="checkbox"/> Letter to Official Draftsperson including Drawings</li> <li>[Total Sheets _____]</li> </ul> <input type="checkbox"/> Petition for Extension of Time	<input type="checkbox"/> Copy of Notice to File Missing Parts of Application  <input type="checkbox"/> Formal Drawing(s)	<input type="checkbox"/> Notice of Appeal to Board of Patent Appeals and Interferences  <input type="checkbox"/> Appeal Brief (in triplicate)
<input type="checkbox"/> Information Disclosure Statement <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> Form PTO-1449</li> <li><input checked="" type="checkbox"/> Copies of IDS Citations B1-B12 and C1-C97</li> </ul> <input type="checkbox"/> Certified Copy of Priority Document(s)	<input type="checkbox"/> Request For Continued Examination (RCE) Transmittal  <input type="checkbox"/> Power of Attorney (Revocation of Prior Powers)	<input type="checkbox"/> Status Inquiry  <input checked="" type="checkbox"/> Return Receipt Postcard  <input checked="" type="checkbox"/> Certificate of First Class Mailing under 37 C.F.R. 1.8
<input type="checkbox"/> Sequence Listing submission <ul style="list-style-type: none"> <li><input type="checkbox"/> Paper Copy/CD</li> <li><input type="checkbox"/> Computer Readable Copy</li> <li><input type="checkbox"/> Statement verifying identity of above</li> </ul>	<input type="checkbox"/> Terminal Disclaimer  <input type="checkbox"/> Executed Declaration and Power of Attorney for Utility or Design Patent Application	<input type="checkbox"/> Certificate of Facsimile Transmission under 37 C.F.R. 1.8  <input type="checkbox"/> Additional Enclosure (please identify below)

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**SIGNATURE BLOCK**

Respectfully submitted,

  
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PATENT  
Attorney Docket No. MFL-003  
5407/9

## IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICANT(S): Yu et al. CONFIRMATION NO.: 4824  
SERIAL NO.: 10/771,739 GROUP NO.: 2123  
FILING DATE: February 4, 2004 EXAMINER: Not yet assigned  
TITLE: Apparatus and Methods for Performing Process Simulation Using a Hybrid Model

Mail Stop Amendment  
Commissioner for Patents  
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### INFORMATION DISCLOSURE STATEMENT

Sir:

In accordance with the provisions of 37 C.F.R. 1.97 and 1.98, Applicants hereby make of record the patents and publications listed on the accompanying Form PTO-1449, and other information contained herein, for consideration by the Examiner in connection with the examination of the above-identified patent application. In accordance with the U.S. Patent Office's partial waiver of the requirement under 37 C.F.R. 1.98(a)(2)(i), only copies of the foreign patent documents and non-patent publications are enclosed. In addition, Applicants wish to inform the Examiner about the following patent applications, and the contents of their file wrappers, including all Office actions issued therein.

1. U.S.S.N. 10/791,218, entitled "Apparatus and Methods For Predicting Properties of Processed Material," filed on March 2, 2004.
2. U.S.S.N. 09/404,932, entitled "Method and Apparatus for Modeling Injection of a Fluid in a Mold Cavity," filed on September 24, 1999.

### REMARKS

In accordance with the provisions of 37 C.F.R. 1.97, this statement is being filed (CHECK ONE):

(1) within three (3) months of the filing date of a national application other than a continued prosecution application under 37 C.F.R. 1.53(d), or within three (3) months of the date of entry of the national stage as set forth in 37 C.F.R. 1.491 in an international application, or before the mailing of the first Office action on the merits, or before the mailing of a first Office action after the filing of a request for continued examination under 37 C.F.R. 1.114; or

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Serial No. 10/771,739

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- (2) after the period defined in (1) but before the mailing date of a **final action or a notice of allowance** under 37 C.F.R. 1.311, and
  - the requisite Statement is below, **OR**
  - the requisite fee under 37 C.F.R. 1.17(p), namely \$180.00, is included herein, or
- (3) after the mailing date of a **final action or notice of allowance** but before the payment of the **issue fee**, **AND**
  - the requisite Statement is below, **AND**
  - the requisite petition fee under 37 C.F.R. 1.17(p), namely \$180.00 is included herein.

It is respectfully requested that each of the patents and publications listed on the attached Form PTO-1449, and other information contained herein, be made of record in this application.

**STATEMENT**

As required under 37 C.F.R. 1.97(e), Applicant(s), through the undersigned, hereby state either that [check the appropriate space only if either (2) or (3) is checked on the previous page and the Statement is required]:

- 1. Each item of information contained in the Information Disclosure Statement was first cited in any communication from a foreign patent office in a counterpart foreign application **not more than three months** prior to the filing of the Information Disclosure Statement; or
- 2. No item of information contained in the Information Disclosure Statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing this Statement after making reasonable inquiry, no item of information contained in the Information Disclosure Statement was known to **any individual** designated in 37 C.F.R. 1.56(c) **more than three months** prior to the filing of the Information Disclosure Statement.

Respectfully submitted,



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3103903-1



FORM PTO - 1449

## INFORMATION DISCLOSURE STATEMENT

ATTORNEY DOCKET NO.: MFL-003

APPLICANT(S): Yu et al.

SERIAL NO.: 10/771,739

FILING DATE: February 4, 2004

GROUP: 2123

## U.S. PATENT DOCUMENTS

EXAM. INIT.		DOCUMENT NUMBER	DATE	NAME	CLASS	SUB CLASS	FILING DATE IF APPROPRIATE
	A1	3,977,255	8-31-1976	Groleau et al.			
	A2	4,387,655	06-14-1983	Chaiken			
	A3	4,504,920	03-12-1985	Mickowski			
	A4	4,534,003	08-06-1985	Manzione			
	A5	4,641,270	02-03-1987	Lalloz et al.			
	A6	4,676,664	06-30-1987	Anderson et al.			
	A7	4,868,751	09-19-1989	Dogru et al.			
	A8	4,989,166	01-29-1991	Akasaka et al.			
	A9	5,031,108	07-09-1991	Fujita et al.			
	A10	5,031,127	07-09-1991	Fujita et al.			
	A11	5,035,598	07-30-1991	Fujita et al.			
	A12	5,072,782	12-17-1991	Namba			
	A13	5,097,431	03-17-1992	Harada et al.			
	A14	5,097,432	03-17-1992	Harada et al.			
	A15	5,146,086	09-08-1992	De et al.			
	A16	5,189,626	02-23-1993	Colburn			
	A17	5,311,932	05-17-1994	Sen et al.			
	A18	5,350,547	09-27-1994	Yamaguchi et al.			
	A19	5,377,119	12-27-1994	Backer et al.			
	A20	5,408,638	04-18-1995	Sagawa et al.			
	A21	5,543,093	08-06-1996	Nakamura et al.			
	A22	5,549,857	08-27-1996	Kamiguchi et al.			
	A23	5,572,434	11-05-1996	Wang et al.			
	A24	5,581,468	12-03-1996	White et al.			

EXAMINER

DATE CONSIDERED

<b>FORM PTO - 1449</b> <b>INFORMATION DISCLOSURE STATEMENT</b>					<b>ATTORNEY DOCKET NO.: MFL-003</b> <b>APPLICANT(S): Yu et al.</b> <b>SERIAL NO.: 10/771,739</b> <b>FILING DATE: February 4, 2004</b> <b>GROUP: 2123</b>			
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**U.S. PATENT DOCUMENTS**

EXAM. INIT.		DOCUMENT NUMBER	DATE	NAME	CLASS	SUB CLASS	FILING DATE IF APPROPRIATE
	A25	5,700,406	12-23-1997	Menhennett et al.			
	A26	5,760,779	06-02-1998	Yamashita et al.			
	A27	5,811,133	09-22-1998	Saito et al.			
	A28	5,812,402	09-22-1998	Nishiyama			
	A29	5,835,379	11-10-1998	Nakano			
	A30	5,989,473	11-23-1999	Haverty			
	A31	6,021,270	02-01-2000	Hanaki et al.			
	A32	6,077,472	06-20-2000	Kataoka et al.			
	A33	6,089,744	07-18-2000	Chen et al.			
	A34	6,096,088	08-01-2000	Yu et al.			
	A35	6,161,057	12-12-2000	Nakano			
	A36	6,180,201	01-30-2001	Sandstrom			
	A37	6,192,327	02-20-2001	Nishiyama et al.			
	A38	6,248,103	06-19-2001	Tannenbaum et al.			
	A39	6,327,553	12-04-2001	Nishiyama et al.			

**FOREIGN PATENT DOCUMENTS**

EXAM. INIT.		DOCUMENT NUMBER	DATE	COUNTRY CODE	CLASS	SUB CLASS	FILING DATE	ABSTRACT ONLY	ENGLISH LANG Y/N
	B1	AU-A-27152/95	02-15-1996	AU				N	Y
	B2	721978	07-20-2000	AU				N	Y
	B3	0 525 198 A1	02-03-1993	EP				N	Y
	B4	0 698 467 A1	02-28-1996	EP				N	Y
	B5	0 747 198 A2	12-11-1996	EP				N	Y

EXAMINER	DATE CONSIDERED
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<b>FORM PTO - 1449</b> <b>INFORMATION DISCLOSURE STATEMENT</b>				<b>ATTORNEY DOCKET NO.: MFL-003</b> <b>APPLICANT(S): Yu et al.</b> <b>SERIAL NO.: 10/771,739</b> <b>FILING DATE: February 4, 2004</b> <b>GROUP: 2123</b>					
<b>FOREIGN PATENT DOCUMENTS</b>									
EXAM. INIT.		DOCUMENT NUMBER	DATE	COUNTRY CODE	CLASS	SUB CLASS	FILING DATE	ABSTRACT ONLY	ENGLISH LANG Y/N
	B6	4305424	10-28-1992	JP				Y	Y
	B7	4331125	11-19-1992	JP				Y	Y
	B8	7125034	05-16-1995	JP				Y	Y
	B9	8-230007	09-10-1996	JP				Y	Y
	B10	337718	02-28-2000	NZ				N	Y
	B11	98/43179	10-01-1998	WO				N	Y
	B12	01/23163 A1	04-05-2001	WO				N	Y
<b>OTHER ART, JOURNAL ARTICLES, ETC.</b>									
EXAM. INIT.	<b>OTHER DOCUMENTS: (Including Author, Title, Date, Relevant Pages, Place of Publication)</b>								
	C1	Advani et al., "The Use of Tensors to Describe and Predict Fiber Orientation in Short Fiber Composites," <u>J. Rheol.</u> , 31(8):751-784 (1987).							
	C2	Angelloz et al., "Crystallization of Isotactic Polypropylene Under High Pressure ( $\gamma$ phase)," <u>Macromolecules</u> , 33:4138-4145 (2000).							
	C3	Avrami, "Kinetics of Phase Change, I. General Theory," <u>J. Chem. Phys.</u> , 7:1103-1112 (1939).							
	C4	Baaijens, "Calculation of Residual Stresses in Injection Molded Products," <u>Rheologica Acta</u> , 30:284-299 (1991).							
	C5	Batch, "3D Effects in Injection Molding Simulation," <u>ANTEC '94</u> , 1:547-553 (1994).							
	C6	Bathe, "Finite Element Procedures in Engineering Analysis," 407-428 (1982).							
	C7	Batoz et al., "A Discrete Shear Triangular Nine D.O.F. Element for the Analysis of Thick to Very Thin Plates," <u>International Journal for Numerical Methods in Engineering</u> , 28:533-560 (1989).							
	C8	Batoz et al., "Formulation and Evaluation of New Triangular, Quadrilateral, Pentagonal and Hexagonal Discrete Kirchhoff plate/shell Elements," <u>International Journal for Numerical Methods in Engineering</u> , 52:615-630 (2001).							
	C9	Begehr et al., "Hele-Shaw Type flows in $R^n$ ," <u>Nonlinear Analysis, Theory, Methods &amp; Applications</u> , Great Britain, 10(1):65-66 (1986).							
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<b>EXAM. INIT.</b>	<b>OTHER DOCUMENTS: (Including Author, Title, Date, Relevant Pages, Place of Publication)</b>	
	C10	Begehr et al., "Non-Newtonian Hele-Shaw flows in $n \geq 2$ Dimensions," <u>Nonlinear Analysis, Theory, Methods &amp; Applications</u> , Great Britain, 11(1):17-18 (1987).
	C11	Belytschko, "Meshless Methods: An Overview and Recent Developments," <u>Computer Methods in Applied Mechanics and Engineering</u> (Special Issue on Meshless Methods), 139:3-77 (1996).
	C12	Bergan et al., "A Triangular Membrane Element with Rotational Degrees of Freedom," <u>Computer Methods in Applied Mechanics and Engineering</u> , 50(1):25-69 (1985).
	C13	Booij, "The Energy Storage in the Rouse Model in an Arbitrary Flow Field," <u>J. Chem. Phys.</u> , 80(9.1):4571-4572 (1984).
	C14	Brincat et al., "Contraction Pressure Loss; Influence of Temperature and Fibre Reinforcement," Swinburne University of Technology, Moldflow Pty. Ltd., and Sunkyong Industries, Sorrento, Italy, 2 pgs. (1996).
	C15	Brooks et al., "Streamline Upwind/Petrov-Galerkin Formulations for Convection Dominated Flows with Particular Emphasis on the Incompressible Navier-Stokes Equations," <u>Computer Methods in Applied Mechanics and Engineering</u> , 32:199-259 (1982).
	C16	Bushman et al., "A Continuum Model for the Dynamics of Flow-Induced Crystallization," <u>J. Polym. Sci.: Part B: Polymer Physics</u> , 34:2393-2407 (1996).
	C17	Chaubal et al., "A Closure Approximation of Liquid Crystalline Polymer Models Based on Parametric Density Estimation," <u>J. Rheol.</u> , 42(1):177-201 (1998).
	C18	Chung et al., "Invariant-Based Optimal Fitting Closure Approximation for the Numerical Prediction of Flow-Induced Fiber Orientation," <u>J. Rheol.</u> , 46(1):169-194 (2002).
	C19	Coppola et al., "Microrheological Modeling of Flow-Induced Crystallization," <u>Macromolecules</u> , 34:5030-5036 (2001).
	C20	Costa et al., "An Adaptation of the Boundary Element Method for Modeling Gas Injection Molding," <u>Simulation of Materials Processing: Theory, Methods and Applications</u> , Rotterdam, The Netherlands, 1113-1118 (1995).
	C21	Costa et al., "Gas Injection Molding Simulation By the Boundary Element Method," Swinburne University of Technology and Moldflow Pty. Ltd., Melbourne, Australia, 11 pgs. (1994).
	C22	Daily et al., "Fluid Dynamics," 164-165, 180-185 (1966).
	C23	Deanin, "Polymer Structure, Properties and Applications," pp. 162-185; 189-284; and 351-412.
	C24	Deitz, "Optimizing injection-molded parts," <u>Mechanical Engineering</u> , 118(10):89-90 (1996).
<b>EXAMINER</b>		<b>DATE CONSIDERED</b>

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<b>OTHER ART, JOURNAL ARTICLES, ETC.</b>		
<b>EXAM. INIT.</b>	<b>OTHER DOCUMENTS: (Including Author, Title, Date, Relevant Pages, Place of Publication)</b>	
	C25	Ding et al., "Finite element simulation of an injection moulding process," <u>International Journal for Numerical Methods for Heat and Fluid Flow</u> 7(7):751-766 (1997).
	C26	Doufas et al, "A Continuum Model for Flow-Induced Crystallization of Polymer Melts," <u>J. Rheol.</u> , 43(1):85-109 (1999).
	C27	Doufas et al., "Simulation of Melt Spinning Including Flow-Induced Crystallization. Part I. Model Development and Predictions," <u>J. Non-Newtonian Fluid Mech.</u> , 92:27-66 (2000).
	C28	Doufas et al., "Simulation of Melt Spinning Including Flow-Induced Crystallization. Part II. Quantitative Comparisons with Industrial Spinline Data," <u>J. Non-Newtonian Fluid Mech.</u> , 92:81-103 (2000).
	C29	Doufas et al., "Simulation of Melt Spinning Including Flow-Induced Crystallization. Part III. Quantitative Comparisons with PET Spinline Data," <u>J. Rheol.</u> , 45(2):403-419 (2001).
	C30	Duarte, "A Review of Some Meshless Methods to Solve Partial Differential Equations," <u>TICAM Report 95-06</u> , 1-37.
	C31	Eder et al, "Crystallization," H.E.H. Meijer (ed.), <u>Processing of Polymers</u> , Vol. 18 <u>Material Science and Technology: A Compressive Treatment</u> , Chapter 5, 269-342 (VCH, Weinheim, 1997).
	C32	Eder et al, "Crystallization Processes in Quiescent and Moving Polymer Melts Under Heat Transfer Conditions," <u>Progress in Polymer Science</u> , 15:629-714 (1990).
	C33	Fan, "Viscosity, First Normal-Stress Coefficient and Molecular Stretching in Dilute Polymer Solutions," <u>J. Non-Newtonian Fluid Mech.</u> , 17:125-144 (1985).
	C34	Fan et al., "Simulation of Fibre Suspension Flows by the Brownian Configuration Field Method," <u>J. Non-Newtonian Fluid Mech.</u> , 84:257-274 (1999).
	C35	Fan et al., "Warpage Analysis of Solid Geometry," <u>Society of Plastic Engineers Inc., ANTEC 2000 Conference Proceedings Volume I – Processing</u> , 723-726 (2000).
	C36	Feng et al., "Closure Approximations for the Doi Theory: Which to Use in Simulating Complex Flows of Liquid-Crystalline Polymers?" <u>J. Rheol.</u> , 42(5):1095-1119 (1998).
	C37	Friedl, "Progress Towards True 3D CAE Analysis for Injection Molding," Moldflow Pty. Ltd., 5 pgs. (1996).
	C38	Fulchiron et al, "Analysis of the Pressure Effect on the Crystallization Kinetics of Polypropylene: Dilatometric Measurements and Thermal Gradient Modeling," <u>J. Macromolecular Science – Physics</u> , 40:297-314 (2001).
	C39	"Getting Started with MF/Flow3D," Release 1.0.0, Moldflow Corporation, pp. i, ii, 1-84, (September 1998).
	C40	"Getting Started with Moldflow Plastics Insight," Release 1.0, Moldflow Corporation, pp. i, ii, 1-91, (June 1999).
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<b>EXAM. INIT.</b>	<b>OTHER DOCUMENTS: (Including Author, Title, Date, Relevant Pages, Place of Publication)</b>	
	C41	Güçeri, "Finite Difference Solution of Field Problems," <u>Fundamentals of Computer Modeling for Polymer Processing</u> , C. Tucker, ed., Chapter 5, 198-199 (1989).
	C42	Guo et al., "Crystallinity and Microstructure in Injection Moldings of Isotactic Polypropylenes. Part I: A New Approach to Modeling and Model Parameters," <u>Polym. Eng. Sci.</u> , 39(10):2096-2114 (1999).
	C43	Haschke, "Predicting plastic part life. (the benefits of dynamic mechanical analysis, especially with polymers)," (August 23, 2001) at <a href="http://www.findarticles.com/cf_dls/m3125/16_73/78362412/p1/article.jhtml?term=">http://www.findarticles.com/cf_dls/m3125/16_73/78362412/p1/article.jhtml?term=</a>
	C44	Hétu et al., "Three-dimensional Finite Element Simulation of Mold Filling Processes," <u>Simulation of Materials Processing: Theory, Methods and Applications</u> , Rotterdam, Netherlands, 1135-1140 (1995).
	C45	Hieber et al. "A Finite-Element/Finite-Difference Simulation of the Injection-Molding Filling Process," <u>Journal of Non-Newtonian Fluid Mechanics</u> , 7:1-32 (1980).
	C46	Hirt et al., "Volume of Fluid (VOF) Method for the Dynamics of Free Boundaries," <u>Journal of Computational Physics</u> , 39:201-225 (1981).
	C47	Hoffman, et al, "Kinetics of Crystallization from the Melt and Chain Folding in Polyethylene Fractions Revisited: Theory and Experiment," <u>Polymer</u> , 38(13):3151-3212 (1997).
	C48	Holman, "Heat Transfer," McGraw-Hill, Singapore, 136-139 (1989).
	C49	"Installation Guide for Moldflow Plastics Insight," Release 1.0.1, Moldflow Corporation, pp. i, 1-73 (June 1999).
	C50	Kennedy, "Flow Analysis of Injection Molds," Germany, entire book (1995).
	C51	Kennedy, "Governing Equations for the Filling Phase," <u>Flow Analysis of Injection Molds</u> , Hanser Publishers, Munich Vienna New York, 59-90 (1995).
	C52	Kennedy, et al., "Plastic Cae Analysis of Solid Geometry," <u>Antec '97</u> , 666-669 (1997).
	C53	Kolmogoroff, "On a Statistical Theory of Crystallization of Melts," <u>Bull. Akad. Sci. USSR, Class Sci., Math. Nat.</u> , 1:355-359 (1937).
	C54	Koscher et al., "Influence of Shear on Polypropylene Crystallization: Morphology Development and Kinetics," <u>Polymer</u> 43:6931-6942 (2002).
	C55	Krieger et al., "A Mechanism for Non-Newtonian Flow in Suspensions of Rigid Spheres," <u>Trans. Soc. Rheol.</u> , 3:137-152 (1959).
<b>EXAMINER</b>		<b>DATE CONSIDERED</b>

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<b>EXAM. INIT.</b>	<b>OTHER DOCUMENTS: (Including Author, Title, Date, Relevant Pages, Place of Publication)</b>	
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<b>INFORMATION DISCLOSURE STATEMENT</b>	<b>APPLICANT(S): Yu et al</b>
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	<b>GROUP: 2123</b>

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